

Information Infrastructure and Use of Electronic Media in Indian Libraries

Dr. A. Lakshmana Moorthy

*Technical Information Centre, Defence Research & Development
Laboratory, Hyderabad-500 058*

and

Prof. C.R. Karisiddappa

*Dept of Library & Information Science, Karnatak University
Dharwad-580 003*

ABSTRACT

The paper covers information infrastructure available in India.. Defines electronic media as applicable for libraries. The results of a survey of Indian libraries with respect to the availability of information technology infrastructure for accessing electronic media and dissemination of information, use of computers and the extent of progress in library automation, use of CD-ROM databases and electronic/online journals. It also deals with the availability of telephone, fax, e-mail, Internet in Indian libraries as well as the perceived impact of digital libraries on library system and its functions.

1. INTRODUCTION

In recent times, many developments have taken place in the library management field in the country. Quite a number of libraries started using the new technologies. Use of computers in house keeping operations has been on the increase. So is access to databases through local, regional or national networks and the transmission of important and urgent documents through telefacsimile or e-mail. Library automation has been initiated by many libraries which have started developing bibliographic databases of their holdings. NICNET and ERNET have popularised the usage of e-mail and Internet; many libraries are using them to serve their users in an effective and efficient way. Some metropolitan/city library networks have also been initiated; a couple of them started functioning and are providing various services through these networks.

Recently a study was undertaken to for finding the use of Information Technology infrastructure and assessing the extent of use of electronic media in libraries in India. The main objectives of the study were

- To know the extent of use of e-media in library and information work,
- To find out the level of automation in libraries and information centres,
- To assess the infrastructure available in libraries for meeting the ever growing demands of users,
- To know the training and reorientation needs of library staff to cope up with the new technologies and e-media, and problems, if any, faced in adopting them,
- To know if the libraries are aware of copyright and licensing policies/ regimes, and
- To suggest ways and means to improve the situation, if warranted.

Such a study would be helpful for the following reasons:

- The information on the availability of IT-related infrastructure, hardware/ software and also networking will help in planning and improvement of information services in libraries and also help in the optimal utilisation of resources,
- Understanding the benefits and the potential of e-media will help in improving the existing infrastructure for providing quality information services,
- Knowing the level of awareness of the librarians to the various advantages and implications of using e-media would help in taking necessary steps to meet the challenges posed by the new technologies,
- Finding out the current status and the level of training and re-orientation needed for the library staff in using the electronic media and IT products will greatly facilitate to take necessary steps in meeting these requirements in a systematic way,
- The data will provide inputs to decision makers whether to introduce regular courses in the emerging technologies at the graduate and postgraduate levels in the library and information science curricula, and
- Many libraries are taking steps to switch over from their traditional roles into technology-enabled service-centred roles; the study will be of great help to take policy decisions and corrective measures, if necessary, in this direction.

2. INFORMATION INFRASTRUCTURE

Developments in the field of communications coupled with the developments in the areas of computers made access of remotely-stored

information, search, download or file transfer (in case of large files) possible. These computer-based information retrieval systems and networks became popular from the 1980s and libraries started using these for satisfying the demands of the users. Although these systems offer quick results, the costs involved are high. Electronic messaging, e-mail and electronic data interchange are possible through networks (Weiss, 1997).

Information technologies have been playing a vital role in the day to day transactions of the information society. The information society is characterised by information as the key resource, information (knowledge) workers as its main type of employment, research institutions as its base, and computers, electronics and telecommunications as its basic technology components. The advances in ITs made it possible to make the home or even room as 'virtual office' to carry out the tasks assigned to an individual or even supervise the work of team members. Common applications of information technologies in information services include access to databases and electronic information resources by remote users through networks; electronic file transfer, including internet protocols like FTP; electronic messaging through e-mail, online database searching like those held by Dialog, BRS, STN, etc as well as CD-ROM databases in a LAN/WAN environment.

Information technology infrastructure is vital for libraries for accessing information. India has a strong IT base with a CAGR of about 40 per cent over the last five years and accounts US\$ 2.2 billion. About 15-20 per cent of computers installed in the country are connected to local area networks and is expected to grow at a faster rate in the next 3-5 years. However, the IT diffusion in India is lower than other developing economies. This is because of low IT spending in the country (0.7 per cent as against 3-5 per cent of GDP for developed economies), high costs of technology, lack of inter connectivity between existing networks making non-utilisation of bandwidth, lack of IT education and training and absence of a common agenda and thrust by government, IT industry and users. The PC density is low at present but is improving with the steep fall in the PC prices.

As developed countries are following and encouraging paperless, electronic transactions, India too needs to create a National Information Infrastructure (NII) as a strategic initiative. Absence of such an infrastructure may adversely affect the socio-economic development of the country. Although the benefits of NII initiatives were well known from the experiences of such initiatives taken by developed countries, neither the government nor the

industry made efforts in this direction in the country. Wide dispersion of education and training supporting lifelong learning, information network-based economic growth, improved communication links, research applications in engineering, healthcare, science and technology, etc. are some of the major benefits of NII initiatives. The NII is expected to integrate the users; their information needs; the providers (content builders) of information; the information including graphics, voice, text and data; application software to deliver information; computers and related peripherals for accessing information from NII; and the network to inter-link the users, providers and information. At present, many components of NII already exist in the country, in isolation. These components, viz., the IT base, the public and private computer networks, and telecommunication, TV and radio networks. However, the content and content providers need to be developed/encouraged.

As high priorities in the strategy to realise the NII, the Ninth Five Year Plan (1997-2002) for Electronic Industry (1997, p. 78-79) envisages a high-speed backbone network with 34/140/560 Mbps covering 6 metros, access technologies like ISDN, VSAT and radio link, and integration of existing networks in the country through a common interface. Other factors of thrust are high end scaleable servers for distributed processing, computing, storage and retrieval; multilingual user interfaces and tools, and NII nodes. The applications of NII include literacy and education, e-commerce, electronic banking, and safe and secure life. By the end of Ninth Five Year Plan, the NII initiative envisages one NII node each at the block and the Panchayat levels in 10 years, diffusion of over 10 million NII nodes, increase of R&D budget for IT from the current 0.7 to 2 per cent, electronic access and Web sites for each government department up to district level and schools, colleges, hospitals, etc; public e-mail boxes to 10 per cent of the population (DOE, 1997, p. 83).

3. ELECTRONIC MEDIA

Electronic media as applicable to the libraries include computers and related peripherals such as hardware, diskettes, magnetic tapes, and various optical disks such as CD-ROM, magneto-optical disks, video disks, and laser disks used for storage of information; library networks and communication technologies used for information transmission and dissemination; and electronic publications including online bibliographic databases, primary (full text) and secondary publications on CD-ROM, and online journals. The emergence of e-media has changed the basic functions of libraries such as acquisitions, processing, storage, dissemination and reference services. The

use of e-media facilitates enhancement in the speed of service, number of users served, the quantum and exhaustiveness of information provided. This has led to the improvement, in general, of the quality of services provided by the libraries using the e-media.

The developments in mass storage technologies coupled with the innovations in computers and communications have brought in new forms of publications known by the generic term electronic publishing (e-publishing). Various electronic publications (e-publications) like bibliographic and full-text CD-ROM databases, and electronic and online journals had a profound impact on the libraries. The development of digital and virtual libraries is an important one in this field. In recent times some pioneering projects have been undertaken for the development and validation of technologies towards creating digital and virtual libraries. Since all these developments are part of or closely related to e-media, the present study covers their impact on and implications for libraries.

Communication technologies have enabled the establishment of many infrastructure and library networks which heralded a new era in the resource sharing, exchanging information and communication between libraries. Internet is the most important innovation in this field that had a far reaching impact and influence on the way libraries function. Internet-based media and tools like e-mail, bulletin boards, newsgroups and electronic conferences facilitate faster exchange of ideas, news, research papers, preprints, and professional communications bringing library community closer.

4. FINDINGS FROM THE STUDY

4.1 Methodology

A survey using an open ended questionnaire was used to elicit information from the respondents (librarians). The *Directory of R&D Institutions* (DST, 1996) was used to prepare a list of institutions for mailing the questionnaire. Since use of e-media requires certain minimum infrastructure, which in turn depends upon financial position of the library, S&T organisations, universities and institutions of national importance were selected. Further, it has been found that not all institutions have their own libraries and some laboratories/complexes house more than one institution but share resources of a common library; some laboratories do not have their own library and depend on other libraries. A final list of 344 institutions comprising institutions from Council of Scientific & Industrial Research/Department of Science and Technology (40 libraries), Department of Atomic

Energy (10), Defence Research & Development Organisation (42), Indian Council of Agricultural Research (50), Indian Council of Medical Research (15), Indian Space Research Organisation (9), and Universities (178) was prepared. In all 153 responses were received — 89 of them (59%) in response to the first mailing and 64 (41%) for the two reminders. The response accounts for 44.5% in agreement with the observations made by Goode and Hatt (1952) and Miller and Erdos (1970) and compares well with the responses received from mail surveys in social sciences.

Of the 153 responses received, 78 libraries are in government sector, 69 belong to autonomous institutions, and 6 did not answer. By nature of the parent institutions to which the libraries are attached, 72 are from R&D institutions, 70 are from academia, and 11 are from other types of organizations.

4.2 Infrastructure and Use of IT

Some 13 questions with a number of supplementary questions were included in this section. Two questions were included to elicit information on the hardware and software availability and usage; four questions on the library automation, database development, and networking activities; three questions on the use of electronic/digital media including subscription of CD-ROM databases; one question on online searching of foreign databases; two questions on online electronic journals; and one question to find out the infrastructure for dissemination of information including accessing electronic information resources over Internet.

4.3 Use of Computers in Libraries

The respondents were asked if they are using computers and if so, what type of hardware and software, including application software. It is partly an open-ended question with space to record information about these items (other than what has been included in the questionnaire). They were also asked as to how long the computers and other IT equipment is being used and the software details, etc. Analysis of data reveals that while 13 (8.5%) did not answer the question, as many as 115 (75.3%) are using computers in library work. Only 25 (16.3%) are not yet using, among which a few recorded that they are in the process of acquiring computers. Of the 115 who are using computers, 30 (19.6%) are using between 1 and 2 years, 18 (11.8%) are using between 2 and 5 years, and a majority, i.e., 67 (43.2%) are using computers for more than 5 years. This shows that use of computers in

libraries is on the increase and in a couple of years, computers would penetrate all the libraries.

With respect to hardware availability, 23 (15%) did not answer the question and a further 17 (11.1%) indicated that they have no computers. Among the remaining libraries which possessed computers, as many as 10 (6.8%) have 10 or more computers with one having as many as 28 computers. A majority (44, i.e., 28.7%) have a single computer each and 81 (52.9%) have computers ranging 1 to 4. There are 29 (14.5%) libraries, which have computers ranging between 5-9. Minicomputers are held by 8 (5.3%) libraries. 22 (14.4%) libraries have workstations of which 12 (7.8%) have one each, and 3 (2%) libraries each have five and eight workstations, each respectively, with one library has 16 workstations. Apple Macintosh Computers are not popular in Indian Libraries. Only four libraries are having one Mac each. In all 47 (31.4%) libraries are possessing laser printers; while 40 (26.1%) of them have one each, 6 have two printers each and one has four laser printers. In the case of CD-ROM drives, 77 (50.4%) libraries have installed among which a majority of 50 (32.7%) have one CD drive each, while 13 have two drives each, 7 with three drives each. One library has 16 CD-ROM drives and another 13 drives. This shows, that a majority of the libraries have the infrastructure to use CD-ROM databases. However, a little over a third of the libraries (57) possess modems; 37 (24.2%). Of them one each, 15 (9.8%) with two each with two libraries possessing 10 modems each. This indicates the low penetration of telecommunication infrastructure. As regards to the use of computer and communication infrastructure for information dissemination, a majority of the responding libraries (43.2%, 66) are using computer for more than 5 years, while about one-fifth (19.6%, 30) are using between 1-2 years. Among the respondents, a majority are involved in library automation, and using Fax for more than 5 years while in the case of using online searching of international databases, CD-ROM databases and Internet, those using between 1-2 years are more.

4.4 Library Automation Software

There are a number of library automation software packages in use in India. Many of these packages were the result of the efforts of institutions which owing to the specific requirements and the nature of routines and services, developed them in different programming languages. Lack of coordination amongst these libraries, multiplicity of formats used and absence of a national agency to coordinate/direct such efforts are other notable reasons. Thus, those libraries that have resources were able to develop automation software in-house, others outsource experience through contracts.

During this time, initially the MINISIS and later the CDS/ISIS, promoted by Unesco and distributed by NISSAT in India, has found some users. This was mainly because of its free availability and the training imparted by NISSAT. Over a period of time its users have grown. In the late 1980s and the early 1990s, many private firms and public sector units have shown interest and a few packages have been developed. The LibSys package is one such software package, which is popular among the high-end, integrated library automation software.

The questionnaire listed 19 different software packages and an open column to specify any other package used. The response was encouraging. Although there were 45 (29.3%) libraries not using any library automation software, the remaining 108 (70.7%) libraries were using some 16 different types of automation software packages. There were 21 (13.7%) libraries using in-house developed software, a majority of which again would be dissimilar from each other. Some of the libraries are using more than one software package resulting in 133 instances of usage of some software package. Out of the 108 libraries, which use library automation software package, a majority of these libraries were using CDS/ISIS (including one instance of MINISIS). In all 65 libraries (accounting for about 60.2 per cent) are using CDS/ISIS, out of which 30 are from universities and 35 from other instances. Coupled with the 35 libraries which use this software (most of them are common) for database purposes, CDS/ISIS becomes the most popular software package in use in Indian libraries. This is on expected lines due to the reasons explained earlier. LibSys software is a distant second with 23 (21.3%) libraries, 8 of them from universities, using the software. Suchika, the library automation software package developed by DESIDOC with 9 (8.3%) libraries, Basis Plus promoted by National Informatics Centre with 5 (4.6%) libraries, Sanjay and SLIM with 4 (3.7%) libraries each, and LIBRIS with 3 (2.8%) libraries are the other software packages. There are 8 other software packages each being used by one library. There are about 11 libraries who did not identify the software package developed in-house by them.

Of the 153 libraries majority of (52.3%) have purchased the software while 21 (13.7%) reported to have developed the library automation software in-house. Of the 52 (34%) libraries which did not reply to this question whether the software package is developed in-house or purchased some might have got the package free of charge. This is the case of CDS/ISIS initially as well as the Suchika software developed by DESIDOC, which is freely distributed to other DRDO laboratories/establishments. The respondents were also requested to answer the various house keeping operations covered

by the software. Cataloguing is the most widely computerised routine with 85 (78.7%); this is closely followed by circulation with 57 (52.8%), acquisition with 55 (50.9%), serials control with 54 (50%), OPAC with 46 (42.6%), budgeting with 42 (38.9%), and classification with 28 (25.9%). Other house keeping operations like current journal content service, etc are provided by 16 (14.8%) libraries only.

4.5 Use of E-media

CD-ROM databases form an important component of the e-media. So, as many as three questions including six supplementary questions were included to elicit information from libraries. There are 65 (43.1%) libraries, which are subscribing to CD-ROM databases; 29 of them provide CD-ROM based information services of which 20 provide on a daily basis, 1 on weekly basis, and 8 on monthly basis. A question on the number users of CD-ROM databases was included which was answered by 39 libraries; the users range from 3 to 999. The number of CD titles subscribed received response from 55 libraries. Of these, 12 libraries subscribe to one title each and 14 libraries subscribe two titles each. On the whole, there are 44 libraries subscribing to less than 10 titles each; another 8 libraries subscribe between 10 and 20 titles, and three subscribe more than 30 titles each. One academic library in the agricultural sciences field holds as many as 70 CD-ROM databases. When a break-up of bibliographic and full-text databases was considered, only 40 and 19 libraries, respectively responded. With respect to bibliographic databases, 32 libraries subscribe between 1 and 8 CD-ROM titles each with 8 libraries subscribing to 10 and more (maximum 17) bibliographic databases. In the case of full-text databases, only 16 libraries are subscribing between 1 and 8 CD-ROM titles each; another 3 libraries are subscribing to more than 10 titles each including one library subscribing as many as 53.

A question was included on the broad areas of coverage of CD-ROM databases. Science and technology titles are being subscribed by 39 (25.5%) libraries, followed by engineering (22, 14.4%), social sciences (19, 12.4%), reference works (17, 11.2%), medical sciences (10, 6.6%), and others (13, 8.5%). Although 19 libraries are subscribing full-text journals on CD-ROM, except one library, none of them provided the list of titles subscribed by them. However, except two, others have rated the use of the full-text journals satisfactory. A majority of the libraries search CD-ROM databases up to 5 times per day, with almost an equal number of them searching between 10-20 times a day. In general, the overall use of CD-ROM databases is more than satisfactory.

4.6 Use of Online/Electronic Journals

The number of electronic and online journals as well as the volume of digital information is steadily growing. More and more libraries are embracing electronic journals, and slowly marching towards using online journals, which provide a number of advantages. To find out whether the library heads are aware of the online and electronic journals and if they are willing to subscribe to online journals, two open questions were included in the questionnaire. The respondents were requested to record their opinions against the two questions.

As regards the opinion about the usefulness of the online/electronic journals, 49 (32%) have recorded response. Among these, as many as 16 have expressed that they have no experience/not aware of them or that online journals are not being used in their library and so they cannot comment on the question. Others (33) opined that online journals are very much useful for library users as well as staff; they facilitate online bibliographic searches; they save space, time and cost; they are easy to access and store; they do not mutilate and have no aging problem; they facilitate faster provision of information, Boolean searches and narrowing/widening of search scope to satisfy user's multifarious demands; they allow real-time accessing by multiple users in LAN environment and downloading; and they are up to date and are easy to maintain.

In response to the question if they are subscribing or willing to subscribe, almost a half (74, 48.3%) replied affirmatively, while a little over one-fifth of them (34, 22.3%) replied in the negative, and 45 (29.4%) did not reply. This question also included a supplementary requesting the respondents to record the reasons for their (both positive and negative) replies. As many as 64 have provided their comments which again reflect the advantages of the online journals as well as the concerns and issues involved in accessing them. Those who responded positively felt that currency, speed, saving shelf space, reduced subscription and maintenance costs, ability to access latest information instantaneously, access beyond office hours, quicker publication and delivery of issues, absence of binding and related costs, multi user access from individual terminals including saving of user search time, browsing of related articles/journals, etc as the reasons for their willing ness to subscribe online journals. As many as 20 respondents expressed relief as the problem of missing or loss of issues in transit/post, which is a primary concern of print media, will be avoided. In the long run, some felt, subscribing to

online journals would prove economical. Those who are subscribing to CD-ROM databases are willing to migrate to online journals to satisfy the demands of their research users.

As regards why they are unwilling to subscribe online journals, respondents expressed inadequate computer literacy among users and library staff in fully utilising the online journals, non-availability of a separate telephone line for library, inadequacy of library budget, browsing difficulties, the expenses related to taking hard copy of articles, lack of training for users/readers who are not conversant with IT and computers, and the need for extensive hardware to satisfy large number of users particularly in university environment.

Many concerns are also expressed by the respondents. These include users' preference to print versions and their reluctance to digital versions due to reasons such as aesthetics and reading at their convenience; the time taken to replace the print version, the narrow bandwidth of Internet and the unreliable and poor telecommunication infrastructure; the inordinate delay to get telephone connection; lack of reliable usage of online journals; and frequent power failures and software problems. A few expressed that caution is needed as the time is not ripe for usage of electronic journals. A couple of respondents emphasised the need to evaluate the online journals. Thus the replies to the utility of online journals reflect both the advantages as well as issues and concerns of the library heads, staff and users. Other concerns of respondents are the high initial cost for infrastructure, higher costs (*vis-à-vis* printed versions) of online journals, unreliable telecommunication links making sending even e-mails difficult, and lack of networking and Internet connectivity (IP addresses). The present communication tariffs are not affordable to many libraries especially for those in the cities where DOT/VSNL nodes are not available. Thus making the online subscription and communication charges more than the subscription charges of printed journals. The constraints of archiving and back volume consultation were also raised by some respondents.

4.7 Infrastructure for Information Dissemination

Out of the 153 respondents, only 37 (24.2%) libraries possess direct telephones showing the inadequacy of communication infrastructure in libraries. An overwhelming 118 (77.2%) possess and use telex while 62 (40.5%) use fax, 77 (50.3%) e-mail and a mere 13 (8.6%) use Internet home page for information dissemination.

Fax : Though fax has become a major facility for dissemination of information, Indian libraries are not able to use them because of lack of direct telephone lines and other constraints. Although 62 libraries are "possessing" fax, only half (31) of them are using it for dissemination of information. A majority (13) send between 1 and 5 pages per day, 9 libraries send 10 pages each per day, and 2 disseminate 15 pages each per day. There are 7 libraries which are major resource centres sending 25 or more pages by fax per day. Of these, 4 libraries fax 25 pages per day, 2 libraries send at the rate of 50 pages per day, and one library sends as much as 70 pages per day. There are 28 libraries which receive information by fax. Here too, 13 libraries receive between 1 and 5 pages each per day, 6 receive 10 pages each per day, and two libraries receive 15 pages each per day. Again there are 7 libraries receiving 25 and more number of pages each per day with 3 receiving 30 pages each per day, 2 receive 40 pages each, and one receives as many as 45 pages per day.

E-mail: Of the 77 respondents who use e-mail for dissemination of information, 73 use it for correspondence followed by 36 for document ordering, 26 for transmitting digital information to remote users, 24 for paper submission, 7 for surveys, and 3 for other purposes. This compares well with other studies (for example Babu and Gopalakrishnan, 1998 and Kogannurmath and Jange, 1999) which too found that over 90 per cent of the use of e-mail is for correspondence. As regards the utility of e-mail service by users, 52 rated it satisfactory followed by heavy use (15) and very heavy use (3). However, as many as 7 are not satisfied with e-mail use by their users.

Internet : One question was asked to find out the various uses of Internet. E-mail is the major facility used by all the 38 libraries having Internet connectivity while 27 use it for searching databases, 24 for file transfer and 21 for current events and news. Internet is also being used for downloading software (by 13), bulletin board services (12), special interest groups (10), listservs (9), online shopping (1) and for other purposes (2). Although 13 libraries use Internet home page for dissemination of information only 5 libraries have their own home page on Internet.

4.8 Digital Libraries

The developments in the mass storage, computers and communications technologies have resulted in many projects and initiatives for the creation and establishment of digital libraries (DLs). In view of this, as many as four questions were included to elicit information from the respondents on the impact of DLs on the Indian library and information centres. One open

question and three structured questions were given. These questions were intended to know the awareness of the librarians on the impact of DLs on library system and functions. A majority (82, 53.6%) have answered the question with 77 finding positive impact on libraries while 2 replied in negative and 3 expressed that they cannot comment as they are not aware of the DLs. Many of the advantages have been recorded by some of the 77 respondents who found positive impact of DLs. As online electronic journals are a sub-set of DLs, many of the advantages are common. Some of the opinions expressed with respect to DLs include:

- They improve efficiency, productivity, accuracy and flexibility and allow the librarian to attend more innovative jobs.
- For serving users with current S&T information in no time on their desktops.
- For scanning large information resources to provide exhaustive information at a faster pace.
- It is an historical inevitability for libraries to serve user community.
- They have great potential for information handling activities and will change global information scenario.
- Libraries are in transition and are accepting DLs as a reality.

On the negative side, people felt that there will be no cost savings; only those who are engaged in research only will benefit from them; masses will not be interested in DLs; and that the developments will not reach remote places early.

4.9 Impact on Library System

The respondents were requested to answer the impact of DLs on library system as a whole and on library functions. The analysis of the data shows that a majority of the librarians are of the opinion that DLs have a positive impact on libraries. This question got response from 73 to 81 per cent of the total respondents; more than 20-30 per cent responded to the previous question which elicited their view, in general, on the impact of DLs on libraries. This shows that a clear majority (ranging from 55 to 77 %) of the respondents are aware of the various issues and concerns of the electronic media and DLs. More than three-fourths of the respondents (116, 75.8%) visualise positive role of DLs on library professionals in providing services and 106 (69.3%) view that DLs improve the productivity of library professionals. Almost an equal number (117, 76.5%) feel the positive effect

of DLs in meeting the multifarious demands of users and 94 (61.4%) are of the opinion that these will result in positive library-user relationship. A maximum number of 118 (77.1%) are of the view that DLs would improve the quality of services and 109 (71.2%) feel that there would be positive impact on the quantum of qualitative information provided to users. These are reflected again in the positive impact of DLs on the use of library material (103, 67.3%) and the image of the library (104, 68%). Only 84 (54.9%) viewed positive impact of DLs on socio-cultural aspects of libraries and users. The lower response to the socio-cultural impact and the library-user relation ship in the digital era could be attributed to the fact that very little research has been done on these aspects and so the respondents are not able to have a clear idea. This is also reflected in the answers related to the copyright and legal issues.

4.10 Impact on Library Functions

The respondents were requested to choose appropriate answer whether DLs will improve or do not improve or have no effect on various functions of the library. Again the response to the various supplementaries ranged from 60 to 79 per cent. The respondents had no doubt that the library services would improve in the DL environment with 121 (79%) responding so. However, 31 (20.3%) felt that DLs would have no effect on the library services. There was similar response of improved user satisfaction (116, 75.8%), meeting users' needs (114, 74.5%), library services (116, 75.8%), and also library image (104, 68%). However, only 92 (60.1%) felt that positive impact on library use with 15 each (9.8%) responding that DLs would not improve or have no effect on library functions.

It has been reported in the literature that the digital and virtual libraries would have a negative effect on library user interaction which would result in psychological barriers between librarians and users. A majority of respondents do not agree (88, 57.5%) that the DLs will have negative effect on library-user interaction, while 19 (12.5%) agree with it and 13 (8.5%) do not know if it is so. The library without walls was expected to allow users directly access information, minimising the intermediary role of the librarian. Also, this was reported to result in psychological effect on librarians. However, 67 (43.8%) of the respondents to the study do not feel so, while 16 (10.5%) agreed with it and 34 (22.2%) do not know about it. However, a majority of the respondents (60, 39.2%) agree that, the electronic/digital information will have negative effect with respect to copyright, legal and ethical issues, while an equal number do not agree or do not know.

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